LISTING OF CLAIMS:

1. (Currently Amended) A moving body detecting apparatus comprising:

image acquiring means for acquiring <u>a plurality of</u> static images <u>of a predetermined</u> <u>region of a real space sequentially in time</u> ~~continuing in time sequence in the same monitoring~~ ~~range~~; and

~~decision processing means for receiving a plurality of static images continuing in time~~ ~~sequence from said image acquiring means to make a comparison among said static images for~~ ~~making a decision as to whether or not a body moves from an area allowing the existence of a~~ ~~body (which will hereinafter be referred to as an "allowable area"), set in advance in said~~ ~~monitoring range, to an area inhibiting the existence of a body (which will hereinafter be referred~~ ~~to as an "unallowable area"), set in advance in said monitoring range.~~

<u>extracting means for extracting a figure indicating a candidate moving body from said</u> <u>plurality of static images;</u>

<u>setting means for setting a watching region in said predetermined region of said real</u> <u>space, the watching region defining a high probability of existence of said candidate moving</u> <u>body;</u>

<u>first determining means for determining whether or not said candidate moving body is a</u> <u>moving body which moves in said watching region by using information about said figure</u> <u>indicating said candidate moving body extracted from said plurality of static images by said</u> <u>extracting means;</u>

<u>classifying means for classifying said watching region of two or more of the images into</u> <u>either an allowable area or an unallowable area based on an extracted result of the extracting</u>

2

means, said allowable area allowing said moving body to exist therein and said unallowable area prohibiting said moving body from existing therein; and

second determining means for determining that said moving body moves only when said figure indicating said candidate moving body moves from said allowable area to said unallowable area.

Claim 2 (Canceled)

3. (Currently Amended) The apparatus according to claim 1, wherein each of said allowable area and said unallowable area are is prescribed by a boundary line of its outer circumference.

4. (Currently Amended) The apparatus according to claim 1, further comprising:

difference calculating means for calculating a difference of luminance level of images and producing a difference image based on said calculated difference of luminance images,

wherein said image acquiring means acquires a background image of said predetermined region of said real space in addition to said plurality of static images and measures said luminance level of each of said point of said each image of both said plurality of static images and said background image of a predetermined region of a real space,

wherein said decision processing difference calculating means calculates an absolute value of a difference in luminance value level at each point between each of said plurality of static images from said image acquiring means and a said background image stored in advance

3

~~for each pixel to produce a plurality of difference images~~, and produces a plurality of differential images based on said difference in luminance level at each point between said each of said plurality of static images and said background image, and

third determining means for determining if said candidate moving body is a moving body which moves in said watching region based upon a comparison between ~~and makes a comparison between said difference images~~ said plurality of differential images ~~to make a decision as to whether a body moving from said allowable area to said unallowable area exists or not~~.

5. (Currently Amended) The apparatus according to claim 4, further comprising preliminary ~~decision processing~~ determining means for ~~making a comparison~~ calculating a difference with respect to said allowable area between said background image ~~stored in advance~~ and ~~said static image~~ each of said plurality of static images received from said image acquiring means ~~and to make~~ making a preliminary decision as to whether or not ~~a~~ said difference with respect to said allowable area therebetween exceeds a predetermined value based on said calculated result obtained by said difference calculating means,

wherein ~~so that~~ said ~~decision processing means~~ third determining means carries out the ~~decision processing~~ determination only when a preliminary decision result in said preliminary ~~decision processing~~ determining means shows ~~a~~ said difference in luminance level at each point with respect to said allowable area between said background image and each of said plurality of static images ~~exceeding~~ exceeds said predetermined value.

6. (Currently Amended) The apparatus according to claim 4, <u>further comprising:</u>

<u>conversion means for converting each of</u> ~~wherein said decision processing means converts~~ said ~~difference~~ <u>differential</u> images into binary ~~image~~ data and <u>performing image labeling upon said differential images for obtaining information describing at least one of an area and position of said figure of said candidate moving body</u> ~~labels them so that, on the basis of information on an area and position of a pixel set obtained through the conversion and labeling, a decision is made as to whether a moving body exists or not,~~

<u>wherein said first determining means determines whether or not said candidate moving body is a moving body which moves in said watching region based on said obtained information describing at least one of an area and position of said figure of said candidate moving body.</u>

Claim 7 (Canceled)

8. (Canceled) The apparatus according to claim 1, ~~wherein said decision processing means includes~~ <u>further comprising:</u>

motion vector calculating means for calculating, ~~on the basis of information on a position of a pixel set,~~ a motion vector indicative of a <u>difference in position of said figure of said candidate body based upon a luminance level at each point of said each image of both said plurality of static images and said background image; and</u>

5

third determining means for determining whether or not said candidate moving body is a moving body which moves in said watching region based upon said motion vector of said figure of said candidate body.

9. (Currently Amended) The apparatus according to claim 1, further comprising notifying means for notifying the existence of a moving body in said predetermined region of said real space to a user so that said decision processing means issues a command to said notifying means to notify the existence of a moving body to said user when making a decision that said moving body exists in said monitoring range. when said first determining means concludes that said moving body exists in said watching region in said predetermined region of said real space.

10. (Currently Amended) The apparatus according to claim 1, further comprising warning means for warning of a moving body in said predetermined region of said real space so that said decision processing means issues a command to said warning means to warn a moving body when making a decision said first determining means concludes that said moving body continuously exists in said monitoring range said predetermined region of said real space for a predetermined period of time.

11. (Original) The apparatus according to claim 1, wherein said moving body detecting apparatus is used as an antitheft apparatus.

6

12. (Currently Amended) The apparatus according to claim 1, further comprising:

image composing means for producing a composite image from all or a part of said plurality of static images and said background image of said predetermined region of said real space such that each point of said composite image have a highest luminance level among luminance levels of corresponding point of said plurality of static images, and

third determining means for determining whether or not said candidate moving body is a moving body which moves in said watching region ~~wherein said decision processing means receives static images from said image acquiring means to produce a composite image by successively carrying out image composing on said static images so that each pixel has the highest luminance value, and when the number of static images used for the image composing reaches a predetermined value, makes a decision as to whether or not a body moving exists in~~ based on said composite image.

13. (Currently Amended) The apparatus according to claim 12, further comprising:

difference calculating means for calculating ~~wherein said decision processing means receives static images from said image acquiring means to produce difference images by calculate, with respect to each pixel, the absolute value of~~ a difference ~~in~~ of luminance level ~~value between said static~~ of images ~~from said image acquiring means~~ and ~~a background image stored in advance for~~ producing a ~~composite~~ difference image ~~by successively carrying out image composing on said difference images so that each pixel has the highest absolute value, and when the number of difference images used for the image composing reaches a predetermined value, conducts decision processing as to whether or not a body moving exists in said composite image.~~ based on said calculated difference of luminance level of images,

wherein said image acquiring means further acquires a background image of said predetermined region of said real space in addition to said plurality of static images and measures a luminance level of each of said point of said each image of both said plurality of static images and said background image of a predetermined region of said real space,

wherein said difference calculating means calculates a difference in luminance level at each point between each of said plurality of static images and said background image, and produces a plurality of differential images based on said difference in luminance level at each point between said each of said plurality of static images and said background image,

image composing means produces a composite image from all or a part of said plurality of static image and said background image of said predetermined region of said real space such that said each point of said composite image have highest luminance level among luminance levels of a corresponding point of said plurality of static images,

wherein said third determining means determines whether or not said candidate moving body is a moving body which moves in said watching region by using the comparison results compared by the comparison performing means based on said composite image.

14. (Currently Amended) The apparatus according to claim 12, wherein said ~~decision processing~~ third determining means conducts the determining process by which whether or not said candidate moving body is a moving body is judged, ~~decision processing~~ repeatedly.

8

15. (Currently Amended) The apparatus according to claim 12, further comprising preliminary ~~decision processing~~ determining means for ~~making a comparison~~ calculating a difference with respect to ~~a predetermined region~~ said allowable area between a said background image ~~stored in advance~~ and ~~said static image~~ each of said plurality of static images ~~from said image acquiring means~~ to make a preliminary ~~decision~~ determination as to whether or not a said difference ~~therebetween~~ between said background image and each of said plurality of static images exceeds a predetermined value,

wherein ~~so that~~ said ~~decision processing~~ third determining means carries out the ~~decision processing~~ determining only when ~~a preliminary decision result in~~ said preliminary ~~decision processing~~ determining means concludes that ~~shows a~~ said difference between said allowable area in said background image and each of said plurality of static images ~~exceeding said predetermined value~~ is larger than a predetermined level.

16. (Currently Amended) The apparatus according to claim 12, wherein, when receiving one of said static images from said image acquiring means, said ~~decision processing~~ third determining means makes a decision as to whether to select said one of said static images, and continues the decision processing only when selecting said one of said static images.

17. (Currently Amended) The apparatus according to claim 12, further comprising:

~~wherein said decision processing means converts said composite image into binary image data and labels them so that, on the basis of information on an area and shape of a pixel set obtained through the conversion and labeling, a decision is made as to whether a moving body exists or not.~~

9

conversion means for converting each of said difference images into binary data and performing image labeling upon said difference images for obtaining an information about at least one of an area and shape of said figure of said candidate moving body,

wherein said third determining means determines whether or not said candidate moving body is a moving body which moves in said watching region based on said obtained information about at least one of said area and said shape of said figure of said candidate moving body.

Claim 18 (Canceled).

19. (Currently Amended) The apparatus according to claim 12, further comprising notifying means for notifying the existence of a moving body in said predetermined region of said real space to a user so that said decision processing means issues a command to said notifying means to notify the existence of a moving body to said user when making a decision that said moving body exists in a monitoring range when said third determining means determines that said moving body exists in said watching region.

20. (Currently Amended) The apparatus according to claim 8, wherein said motion vector calculating means including further comprising:

an image pickup device made to take a photograph continuously;

image composing means for, on the basis of a plurality of input images continuously by said image pickup device, acquiring, as each of representative pixel values, a maximum value of

~~pixels existing at the same positions in frames of said input images to produce a composite image~~

~~comprising said representative pixel values; and~~

~~composite image processing means for extracting a motion vector indicative of a~~

~~displacement of a photographed body in said frames on the basis of a trajectory of an image~~

~~pickup point appearing in said composite image produced by said image composing means.~~

image composing means for producing a composite image from all or a part of said

plurality of static images and said background image of said predetermined region of said real

space such that said each point of said composite image have highest luminance level among

luminance levels of a corresponding point of said plurality of static images,

wherein said motion vector calculating means for calculating a plurality of motion

vectors, each moving vector being indicative of a difference in position of said figure of said

candidate body between a first position of said figure of said candidate body in a first image of

said plurality of static images and a second one in a second image of said plurality of static

images which acquired after said first image by said image acquiring means, and

fourth determining means for determining whether or not said candidate moving body is

a moving body which moves in said watching region based on said motion vector of said figure

of said candidate body.

21. (Currently Amended) The apparatus according to claim 20, wherein ~~said image~~

~~pickup device is fixed in place, and a movement quantity of a moving body~~ moving length of

said moving body is obtained on the basis of said motion vector extracted by said ~~composite~~

~~image processing~~ motion vector calculating means.

22. (New) The apparatus according to claim 1, further comprising:

motion vector calculating means for calculating difference in position of said figure of said candidate body estimated from one of said static images captured at a first time and another static images captured at a subsequent time of said first time,

wherein said classifying means classifies said watching region into an allowable area and an unallowable area based on said difference vector of positions of said figure of said candidate body obtained by said motion vector calculating means.

23. (New) The apparatus according to claim 11, wherein said antitheft apparatus is provided with a vehicle.

24. (New) A method for detecting a moving body, the method comprising:

acquiring a plurality of static images of a predetermined region of a real space sequentially in time;

extracting a figure of a candidate moving body from said plurality of static images of said predetermined region of said real space based on a result of comparing said plurality of static images;

classifying said predetermined region of said real space into an allowable area and an unallowable area based on a result of extracting said figure of said candidate moving body from said plurality of static images of said predetermined region of said real space, said allowable area

being where existing of said moving body is allowed and said unallowable area being where

existing of said moving body is prohibited; and

determining whether or not said moving body moves in said watching region based on

whether or not said figure of said candidate moving body moves in said watching region from

said allowable area to said unallowable area.

25. (New) The method according to claim 24, further comprising:

setting a watching region in a portion or a whole of said predetermined region of said real

space where said candidate moving body has higher probability of existing and moving therein

based on said comparison result of extracting said figure of said candidate moving body,

wherein said classifying step for classifying said predetermined region of said real space

into an allowable area and an unallowable area is configured to divide only said watching region

of said predetermined region of said real space into an allowable area and an unallowable area.

26. (New) The method according to claim 25, further comprising:

acquiring a background image of said predetermined region of said real space which are

captured in advance; and

producing a plurality of difference images, each of said difference image is obtained by

subtracting said background image of said predetermined region of said real space from each of

said plurality of static images of said predetermined region of said real space,

wherein said extracting step in which said figure of said candidate moving body is

extracted is configured to extract said figure of said candidate moving body based on a result of

13

performing a comparison among said plurality of static images of said predetermined region of said real space.

27. (New) The method according to claim 26, further comprising:

calculating a motion vector being indicative of a difference in position of said figure of said candidate body within a couple of difference images paired up from a plurality of selected images selected from said plurality of difference images of said watching region of said predetermined region of said real space,

wherein said determining step is configured to determine whether or not said moving body moves in said watching region based on whether or not said motion vector of said figure of said candidate moving body moves in said watching region from said allowable area to said unallowable area.

28. (New) The method according to claim 27, wherein said plurality of selected images are selected from said plurality of static images of said predetermined region of said real space based on a maximum contrast in brightness of an individual image of said plurality of selected images.

29. (New) The method according to claim 27, further comprising calculating an area of said figure of said candidate moving body, wherein said determining step is configured to determine whether or not said moving body moves in said watching region is carried out only when area of said candidate body is larger than a predetermined value.

30. (New) The method according to claim 29, wherein said producing step uses said plurality of difference images consisting of a plurality of binary data in which each binary data has an information of position thereof on each of said plurality of difference images and data pertaining said figure of a candidate moving body.

31. (New) The method according to claim 30, wherein said information includes in binary data pertaining said figure of said candidate moving body is brightness of a corresponding position of said difference image.

32. (New) The method according to claim 31, further comprising a recognizing step for issuing a warning of the existence of said moving body in said predetermined region of said real space when said determining step concludes that said moving body moves in said watching region.

33. (New) The method according to claim 24, further comprising a composite image producing step for producing a composite image of said watching region of said predetermined region of said real space which is made by superposing a plurality of selected images from said plurality of static images of said predetermined region of said real space, wherein said extracting step is configured to extract said figure of said candidate moving body from said composite image.

34. (New) The method according to claim 26, further comprising a composite image producing step for producing a composite image of said watching region of said predetermined region of said real space which is made by superposing a plurality of selected images from said plurality of difference images of said predetermined region of said real space obtained in said difference images producing steps, wherin said extracting step is configured to extract said figure of a candidate moving body from said composite image.

35. (New) The method according to claim 34, wherein said composite image producing step is configured to select said plurality of selected images from said plurality of static images of said predetermined region of said real space based on a maximum contrast in brightness within an individual image of said plurality of static images.

36. (New) The method according to claim 35, further comprising a step of calculating area of said figure of said candidate moving body, wherein said determining step is configured to determine whether or not said moving body moves in said watching region is carried out only respect to said candidate body having area larger than a predetermined value.

37. (New) The method according to claim 36, further comprising a recognizing step for issuing a warning of the existence of a moving body in said predetermined region of said real space.

16

38. (New) The method according to claim 27, further comprising a composite image producing step for producing a composite image of said watching region of said predetermined region of said real space which is made by superposing said couple of difference images paired up from said plurality of difference images of said watching region of predetermined region of said real space, wherein said determining step is configured to determine whether or not said moving body moves in said watching region is determined based on whether or not said motion vector of said figure of said candidate moving body moves in said watching region from said allowable area to said unallowable area.

39. (New) The method according to claim 38, wherein said composite image producing step is configured to select said plurality of selected images from said plurality of static images of said predetermined region of said real space based on a maximum contrast in brightness of an individual image of said plurality of selected images.

40. (New) An apparatus for detecting a body moving within a predetermined region of a real space, comprising:

an imaging device for acquiring a plurality of static images of said predetermined region of said real space sequentially in time;

a feature calculating unit for extracting a figure of a candidate moving body from said plurality of static images of said predetermined region of said real space based on a result of comparing said plurality of static images of said predetermined region of said real space;

an area classifying unit for classifying said predetermined region of said real space into

an allowable area and an unallowable area based on a result of extracting said figure of said

candidate moving body from said plurality of static images of said predetermined region of said

real space, said allowable area being where existing of said moving body is allowed and said

unallowable area being where existing of said moving body is prohibited;

a motion detecting unit for determining whether or not said moving body moves in said

watching region based on whether or not said figure of said candidate moving body moves in

said watching region from said allowable area to said unallowable area.

41. (New) The apparatus according to claim 40, wherein said area selecting unit sets a

watching region in a portion or a whole of said predetermined region of said real space where

said candidate moving body has higher probability of existing and moving therein based on said

comparison result of extracting said figure of said candidate moving body, classifies said

watching area of said predetermined region of said real space into an allowable area and an

unallowable area using information about said figure of said candidate moving body, and divides

only said watching region of said predetermined region of said real space into an allowable area

and an unallowable area.

42. (New) The apparatus according to claim 40, further comprising:

a difference calculating unit for differentiating a pair of images,

wherein said difference calculating unit produces a plurality of difference images, each of

said difference image is obtained by subtracting said background image of said predetermined

region of said real space from each of said plurality of static images of said predetermined region of said real space, and

said feature calculating unit extracts said figure of said candidate moving body based on a result of performing a comparison among said plurality of difference images.

43. (New) The apparatus according to claim 41, further comprising:

a difference calculating unit; and

an imaging device for further detecting a background image of said predetermined region of said real space, wherein

said difference calculating unit produces a plurality of difference images of said watching region, each of said difference images of said watching region is obtained by subtracting a corresponding part to said watching region of said background image of said predetermined region of said real space from a further corresponding part to said watching region of each of said plurality of static images, and

said feature calculating unit extracts said figure of a candidate moving body based on a result of performing a comparison among said plurality of difference images of said watching region.

44. (New) The apparatus according to claim 42, wherein said motion detecting unit further calculates a motion vector being indicative of a difference in position of said figure of said candidate body within a couple of difference images paired up from a plurality of selected images selected from said plurality of difference images of said predetermined region of said real

19

space, and determines whether or not said moving body moves in said watching region is determined based on whether or not said motion vector of said figure of said candidate moving body moves in said predetermined region of said real space from said allowable area to said unallowable area.

45. (New) The apparatus according to claim 42, wherein said motion detecting unit further calculates a motion vector being indicative of a difference in position of said figure of said candidate body within a couple of difference images paired up from a plurality of selected images selected from said plurality of difference images of said watching region of predetermined region of said real space, and determines whether or not said moving body moves in said watching region is determined based on whether or not said motion vector of said figure of said candidate moving body moves in said watching region from said allowable area to said unallowable area.

46. (New) The apparatus according to claim 44, wherein

said feature calculating unit further calculates area of said figure of said candidate moving body,

said motion detecting unit determines whether or not said moving body moves in said predetermined region of said real space is carried out only when area of said candidate body is larger than a predetermined value.

47. (New) The apparatus according to claim 45, wherein

said feature calculating unit further calculates area of said figure of said candidate moving body,

said motion detecting unit determines whether or not said moving body moves in said watching region is carried out only when area of said candidate body is larger than a predetermined value.

48. (New) The apparatus according to claim 46, further comprising a recognizing unit for issuing a warning of the existence of a moving body in said predetermined region of said real space, wherein said recognizing unit issues said warning based on a result of whether or not said moving body moves in said predetermined region of said real space.

49. (New) The apparatus according to claim 47, further comprising a recognizing unit for issuing a warning of the existence of a moving body in said predetermined region of said real space, wherein said recognizing unit issues said warning based on a result of whether or not said moving body moves in said watching region.

50. (New) The apparatus according to claim 44, further comprising:

an image composing unit for producing a composite image of said predetermined region of said real space which is made by superposing a plurality of selected images from said plurality of static images of said predetermined region of said real space,

wherein said feature calculating unit extracts said figure of said candidate moving body from said composite image.

51. (New) The apparatus according to claim 45, further comprising:

an image composing unit for producing a composite image of said watching region of said predetermined region of said real space which is made by superposing a plurality of selected images from said plurality of static images of said predetermined region of said real space with only respect to said watching region,

wherein said feature calculating unit extracts said figure of said candidate moving body from said composite image.

52. (New) The apparatus according to claim 50, wherein an image composing unit selects said plurality of selected images from said plurality of static images of said predetermined region of said real space based on a maximum contrast in brightness within an individual image of said plurality of static images.

53. (New) The apparatus according to claim 51, wherein an image composing unit selects said plurality of selected images from said plurality of static images of said predetermined region of said real space based on a maximum contrast in brightness within said watching region of an individual image of said plurality of static images.

54. (New) The apparatus according to claim 52, further comprising:

a recognizing unit for issuing a warning of the existence of a moving body in said predetermined region of said real space,

wherein said recognizing unit issues a warning of the existence of said moving body in said predetermined region of said real space when said determining unit concludes that said moving body moves in said predetermined region of said real space.

55. (New) The apparatus according to claim 53, further comprising:

a recognizing unit for issuing a warning of the existence of a moving body in said watching region,

wherein said recognizing unit issues a warning of the existence of said moving body in said predetermined region of said real space when said determining unit concludes that said moving body moves in said watching region.

56. (New) The apparatus according to claim 44, further comprising:

an image composing unit for producing a composite image of said predetermined region of said real space which is made by superposing said a couple of difference images paired up from a plurality of selected images selected from said plurality of difference images of said predetermined region of said real space,

wherein said motion detecting unit determines whether or not said moving body moves in said watching region based on whether or not said motion vector of said figure of said candidate moving body moves in said predetermined region from said allowable area to said unallowable area.

57. (New) The apparatus according to claim 45, further comprising an image composing

unit for producing a composite image of said watching region of said predetermined region of

said real space which is made by superposing said couple of difference images paired up from a

plurality of selected images selected from said plurality of difference images of said watching

region, wherein said motion detecting unit determines whether or not said moving body moves in

said watching region based on whether or not said motion vector of said figure of said candidate

moving body moves in said watching region from said allowable area to said unallowable area.

58. (New) The apparatus according to claim 56, wherein

said image composing unit selects said plurality of selected images from said plurality of

static images of said predetermined region of said real space based on a maximum contrast in

brightness within an individual image of said plurality of static images.

59. (New) The apparatus according to claim 57, wherein

said image composing unit selects said plurality of selected images from said plurality of

static images of said predetermined region of said real space based on a maximum contrast in

brightness within said watching region of an individual image of said plurality of static images.